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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/623,997	07/21/2003	James A. Hill	HORI 0130 PUS	5480

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EXAMINER	
BELLAMY, TAMIKO D	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,997	HILL, JAMES A.	
	Examiner	Art Unit	
	Tamiko D. Bellamy	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) *24-27* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11/26/04
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (2002/0124662) in view of Daire et al. (5,440,930).

Re claims 1, 14, and 23, Suzuki et al. discloses in figs. 2, 3, and 7 an acoustic pulse generator/transducer (e.g., piezoelectric vibrator 2) (Pg. 3, par. 50.)), and an impedance matching layer (e.g., silica dry film acoustic matching layer 3) (Pg. 3, par 50). The impedance matching layer (3) is made of a silica film, which is equivalent to a low thermal conductivity material. As depicted in fig. 2, Suzuki et al. discloses an impedance matching layer (3) having a reduced length; and it inherently has a length such that traveling waves are no longer present. Suzuki et al. discloses a protective layer (5)(Fig. 3). Suzuki et al. lacks the detail of a thermal management system. Daire et al. discloses a thermal management system (e.g., combination of spacer 11 and fins 20). Daire et al. discloses that the spacer (11) may be of any shape or material such as glass or aluminum (Col. 2, lines 7-11, Col. 3, lines 8-10). Daire et al. discloses that the thermal management system (e.g. heat exchange structure) can be of any shape; and that an aluminum cylinder may have deep grooves on the outside periphery in order to provide for air-cooling fins. Daire et al. discloses that one end cylinder is hollowed out in order to make a cavity

intended to receive an emitter or receiver (Col. 2, lines 32-46). The aluminum cylinder/spacer is equivalent to metal sleeve of the thermal management system. The method of constructing of the thermal management system (e.g., heat exchange structure) that Daire et al. discloses would allow the metal sleeve of the thermal management system to be coupled to an acoustic pulse generator (e.g., emitter). Therefore, to modify Suzuki et al. by employing a thermal management system would have been obvious to one of ordinary skill in the art at the time of the invention since Daire et al. teaches an ultrasonic flowmeter having theses design characteristics. The skilled artisan would be motivated to combine the teachings of Suzuki et al. and Daire et al. since Suzuki et al. states that his invention is applicable to an ultrasonic transducer that carries out a flow rate measurement through which fluid flows and Daire et al. is directed to ultrasonic flowmeter using an ultrasonic transducer.

Re claim 2, Suzuki et al. discloses the impedance matching layer (3) is made of an inorganic oxide or an organic polymer, wherein the inorganic oxide contains at least silicon dioxide (silica) (Pg. 3, par 50). If the impedance matching layer (3) is made of silicon dioxide (silica), the silica inherently has a thermal conductivity that is less 15 W/(m K)

Re claim 3, Suzuki et al. discloses the impedance matching layer (3) is made of an inorganic oxide or an organic polymer, wherein the inorganic oxide contains at least silicon dioxide (silica) (Pg. 3, par 50). If the impedance matching layer (3) is made of silicon dioxide (silica), the silica inherently has a thermal conductivity that is less 1 W/(m K).

Re claim 4, Suzuki et al. discloses in figs. 2, 3, and 6 an acoustic pulse generator (e.g., piezoelectric vibrator 2) (Pg. 3, par. 50.)), and an impedance matching layer (e.g., acoustic matching layer 3). The impedance matching layer (3) is made of a dry gel of an inorganic oxide or an organic polymer, wherein the inorganic oxide contains at least silicon dioxide (silica) (Pg. 3, par 50). , While, Suzuki et al. does not specifically disclose that the matching layer is **a foam** silica; Suzuki et al. does make use of a silica gel. The court held in In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960), that the selection of a well known material is a design choice clearly in the preview of one having ordinary skill in the art. Therefore, to employ Suzuki et al. on a foam silica on would have been obvious to one of ordinary skill in the art at the time of the invention since this reference explicitly teaches its use on a Suzuki et al. states that his invention is applicable to an ultrasonic transducer that carries out a flow rate measurement through which fluid flows that include a matching layer containing silica.

Re claim 5, Suzuki et al. discloses in figs. 2, 3, and 6 an acoustic pulse generator (e.g., piezoelectric vibrator 2) (Pg. 3, par. 50.)), and an impedance matching layer (e.g., acoustic matching layer 3). The impedance matching layer (3) is made of a dry gel of an inorganic oxide or an organic polymer, wherein the inorganic oxide contains at least silicon dioxide (silica) (Pg. 3, par 50).

Re claims 6, 7,15, and 16, Suzuki et al. discloses in figs. 2, 3, and 7 an acoustic pulse generator (e.g., piezoelectric vibrator 2) (Pg. 3, par. 50.)), and an impedance matching layer (e.g., silica dry film acoustic matching layer 3) (Pg. 3, par 50). Suzuki et al. lacks the detail of a thermal management system having a thermal conductivity of at

least 15W/(m K). Daire et al. discloses a thermal management system (e.g., combination of spacer 11 and fins 20). Daire et al. discloses that the thermal management system (e.g. heat exchange structure) can be of any shape; and that an aluminum cylinder may have deep grooves on the outside periphery in order to provide for air-cooling fins. Daire et al. discloses that one end cylinder is hollowed out in order to make a cavity intended to receive an emitter or receiver (Col. 2, lines 32-46). The aluminum cylinder/spacer is equivalent to metal sleeve of the thermal management system. The aluminum inherently has a thermal conductivity if about 205 W/(m K) which is at least 15 W/(m K) **(Cls. 6 & 15),** or at least 100 W/(m K) **(Cls. 7 & 16).** Therefore, to modify Suzuki et al. by employing a thermal management system with at least a thermal conductivity of 15 or 100 W/(m K) would have been obvious to one of ordinary skill in the art at the time of the invention since Suzuki et al. teaches an ultrasonic flowmeter having theses design characteristics. The skilled artisan would be motivated to combine the teachings of Suzuki et al. and Daire et al. since Suzuki et al. states that his invention is applicable to an ultrasonic transducer that carries out a flow rate measurement through which fluid flows and Daire et al. is directed to ultrasonic flowmeter using an ultrasonic transducer.

Re claims 8 and 17, Suzuki et al. discloses the acoustic matching layer has a depth, which is a quarter of the ultrasonic oscillation frequency (Pg. 2, Par 22.).

Re claims 9 and 18, Suzuki et al. discloses in figs. 2, 3, and 7 an acoustic pulse generator (e.g., piezoelectric vibrator 4), and an impedance matching layer (e.g., silica dry gel acoustic matching layer 3) (pg. 3, par 50). The impedance matching layer (3) is made of a silica gel, which is equivalent to a low thermal conductivity material. Suzuki et

al. lacks the detail of a thermal management system including a plurality of fins. Daire et al. discloses that the thermal management system (e.g. heat exchange structure) can be of any shape; and that an aluminum cylinder may have deep grooves on the outside periphery in order to provide for **air-cooling fins (20)**. Daire et al. discloses that one end cylinder is hollowed out in order to make a cavity intended to receive an emitter or receiver (Col. 2, lines 32-46). The aluminum cylinder/spacer is equivalent to metal sleeve of the thermal management system. Therefore, to modify Suzuki et al. by employing a plurality of fins would have been obvious to one of ordinary skill in the art at the time of the invention since Daire et al. teaches an ultrasonic flowmeter having theses design characteristics. The skilled artisan would be motivated to combine the teachings of Suzuki et al. and Daire et al. since Suzuki et al. states that his invention is applicable to an ultrasonic transducer that carries out a flow rate measurement through which fluid flows and Daire et al. is directed to ultrasonic flowmeter using an ultrasonic transducer.

Re claims 10 and 19, Suzuki et al. discloses an acoustic generator (e.g., piezoelectric element 2).

Re claims 11 and 20, as depicted in figs. 3, and 10, Suzuki et al. discloses a matching layer (e.g., acoustic matching layer 3) with a surface coating (e.g., protective layer 5) in contact with the fluid being measured.

Re claims 12, 13, 21, and 22, Suzuki et al. discloses in figs. 2, 3, and 10 an acoustic pulse generator (e.g., piezoelectric element 2), and an impedance matching layer (e.g., silica dry acoustic matching layer 3) (Pg. 3, par 50). As depicted in fig. 10, Suzuki

et al. discloses the matching layer and the matching layer tip extend into the fluid being measured. Suzuki et al. lacks the detail of a thermal management system arranged to insulate a portion of the matching layer sides, while leaving the tip of the matching layer in contact with the fluid. Re further limitation of claims 13 and 22, Suzuki et al. lacks the detail of the insulated portion is insulated by an air gap formed by the thermal management system. Daire et al. discloses a thermal management system (e.g., combination of spacer 11 and fins 20). Daire et al. discloses that the spacer (11) may be of any shape or material such as glass or aluminum (Col. 2, lines 7-11, Col. 3, lines 8-10). Daire et al. discloses that the thermal management system (e.g. heat exchange structure) can be of any shape; and that an aluminum cylinder may have deep grooves on the outside periphery in order to provide for air-cooling fins. Daire et al. discloses that one end cylinder is hollowed out in order to make a cavity intended to receive an emitter or receiver (Col. 2, lines 32-46). The aluminum cylinder/spacer is equivalent to metal sleeve of the thermal management system. The method of constructing of the thermal management system (e.g., heat exchange structure) that Daire et al. discloses would allow the metal sleeve of the thermal management system to be coupled to an acoustic pulse generator (e.g., emitter), and have an inherent air gap therein. Therefore, to modify Suzuki et al. by employing a thermal management system would have been obvious to one of ordinary skill in the art at the time of the invention since Daire et al. teaches an ultrasonic flowmeter having theses design characteristics. The skilled artisan would be motivated to combine the teachings of Suzuki et al. and Daire et al. since Suzuki et al. states that his invention is applicable to an ultrasonic transducer that carries out a flow

rate measurement through which fluid flows and Daire et al. is directed to ultrasonic flowmeter using an ultrasonic transducer.

Response to Remarks

3. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection. It is the examiners position that claims 1-23 is not patentable in view of the newly applied art of Suzuki et al. (2002/0124662) in view of Daire et al. (5,440,930).

4. The indicated allowability of claims 14-22 are withdrawn in view of the newly discovered reference(s) to Suzuki et al. (2002/0124662) in view of Daire et al. (5,440,930). Rejections based on the newly cited reference(s) follow.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of art with respect to an acoustic transducer with a waveguide extending into a fluid and having a thermal management system attached to the waveguide:

U.S. Pat. No. (4,730,493) as to Lebaud et al.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tamiko D. Bellamy whose telephone number is (571) 272-2190. The examiner can normally be reached on Monday - Friday 7:30 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tamiko Bellamy
T.B.
April 13, 2005

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